1024 BIT (256 x 4) STATIC MOS RAM WITH SEPARATE I/O

- 256 x 4 Organization to Meet Needs for Small System Memories
- Access Time: 1 µsec Max.
- Single +5V Supply Voltage
- Directly TTL Compatible: All Inputs and Outputs
- Statis MOS: No Clocks or Refreshing Required
- Simple Memory Expansion: Chip Enable Input
- Compatible with the 4289
- Inputs Protected: All Inputs Have Protection Against Static Charge
- Low Cost Packaging: 22 Pin Plastic Dual-In-Line Configuration
- Low Power: Typically 150mW
- Three-State Output: OR-Tie Capability
- Output Disable Provided for Ease of Use in Common Data Bus Systems

The Intel® 4101 is a 256 word by 4 bit static random access memory element using normally off N-channel MOS devices integrated on a monolithic array. It uses fully DC stable (static) circuitry and therefore requires no clocks or refreshing to operate. The data is read out nondestructively and has the same polarity as the input data.

The 4101 is designed for memory applications where high performance, low cost, large bit storage, and simple interfacing are important design objectives.

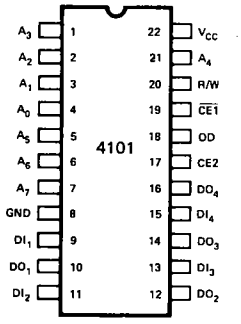
It is directly TTL compatible in all respects: inputs, outputs, and a single +5V supply. Two chip-enables allow easy selection of an individual package when outputs are OR-tied. An output disable is provided so that data inputs and outputs can be tied for common I/O systems. Output disable is then used to eliminate any bi-directional logic.

The Intel® 4101 is fabricated with N-channel silicon gate technology. This technology allows the design and production of high performance, easy-to-use MOS circuits and provides a higher functional density on a monolithic chip than either conventional MOS technology or P-channel silicon gate technology.

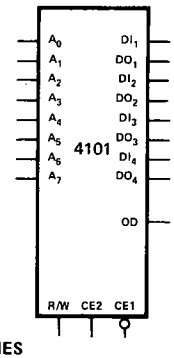
Intel's silicon gate technology also provides excellent protection against contamination. This permits the use of low cost plastic packaging.

MCS-40

PIN CONFIGURATION



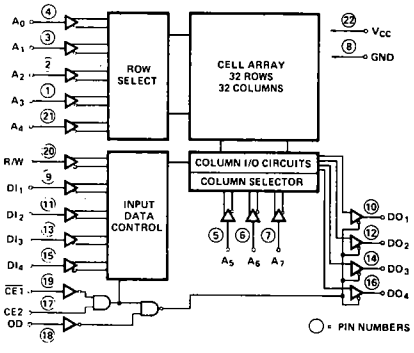
LOGIC SYMBOL



PIN NAMES

D_{IN}	DATA INPUT	OD	OUTPUT DISABLE
$A_0 - A_7$	ADDRESS INPUTS	D_{OUT}	DATA OUTPUT
R/W	READ/WRITE INPUT	V_{CC}	POWER (+5V)
$\overline{CE1}$, CE2	CHIP ENABLE		

BLOCK DIAGRAM



Absolute Maximum Ratings*

Ambient Temperature Under Bias . . . . . 0°C to 70°C

Storage Temperature . . . . . -65°C to +150°C

Voltage On Any Pin
With Respect to Ground . . . . . -0.5V to +7V

Power Dissipation . . . . . 1 Watt

*COMMENT:

Stresses above those listed under "Absolute Maximum Rating" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or at any other condition above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

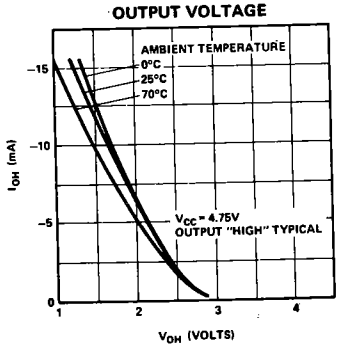
D.C. and Operating Characteristics

T_A = 0°C to 70°C, V_{CC} = 5V ±5% unless otherwise specified.

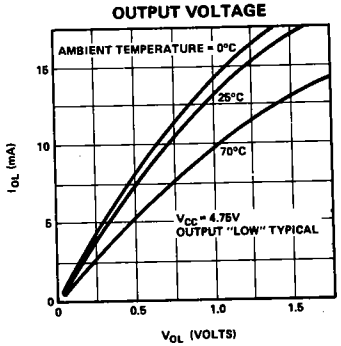
Symbol	Parameter	Min.	Typ.[1]	Max.	Unit	Test Conditions
I_{LI}	Input Current			10	μA	V_{IN} = 0 to 5.25V
I_{LOH}	I/O Leakage Current[2]			15	μA	$\overline{CE}_1$ = 2.2V, V_{OUT} = 4.0V
I_{LOL}	I/O Leakage Current[2]			-50	μA	$\overline{CE}_1$ = 2.2V, V_{OUT} = 0.45V
I_{CC1}	Power Supply Current		30	60	mA	V_{IN} = 5.25V, I_O = 0mA T_A = 25°C
I_{CC2}	Power Supply Current			70	mA	V_{IN} = 5.25V, I_O = 0mA T_A = 0°C
V_{IL}	Input "Low" Voltage	-0.5		+0.65	V	
V_{IH}	Input "High" Voltage	2.2		V_{CC}	V	
V_{OL}	Output "Low" Voltage			+0.45	V	I_{OL} = 2.0mA
V_{OH}	Output "High" Voltage	2.2			V	I_{OH} = -150 μA

Typical D.C. Characteristics

OUTPUT SOURCE CURRENT VS. OUTPUT VOLTAGE



OUTPUT SINK CURRENT VS. OUTPUT VOLTAGE



NOTES: 1. Typical values are for T_A = 25°C and nominal supply voltage.
2. Input and Output tied together.

A.C. Characteristics

READ CYCLE $T_A = 0°C$ to $70°C$, $V_{CC} = 5V \pm 5\%$, unless otherwise specified.

Symbol	Parameter	Min.	Typ.[1]	Max.	Unit	Test Conditions
t_{RC}	Read Cycle	1,000			ns	
t_A	Access Time			1,000	ns	t_r, t_f = 20ns
t_{CO}	Chip Enable To Output			800	ns	V_{IN} = +0.65V to +2.2V
t_{OD}	Output Disable To Output			700	ns	Timing Reference = 1.5V
t_{DF}[3]	Data Output to High Z State	0		200	ns	Load = 1 TTL Gate
t_{OH}	Previous Read Data Valid after change of Address	40			ns	and C_L = 100pF.

WRITE CYCLE

Symbol	Parameter	Min.	Typ.[1]	Max.	Unit	Test Conditions
t_{WC}	Write Cycle	1,000			ns	
t_{AW}	Write Delay	150			ns	t_r, t_f = 20ns
t_{CW}	Chip Enable To Write	900			ns	V_{IN} = +0.65V to +2.2V
t_{DW}	Data Setup	700			ns	Timing Reference = 1.5V
t_{DH}	Data Hold	100			ns	Load = 1 TTL Gate
t_{WP}	Write Pulse	750			ns	and C_L = 100pF.
t_{WR}	Write Recovery	50			ns	
t_{DS}	Output Disable Setup	200			ns	

A. C. CONDITIONS OF TEST

Input Pulse Levels: +0.65 Volt to 2.2 Volt

Input Pulse Rise and Fall Times: 20nsec

Timing Measurement Reference Level: 1.5 Volt

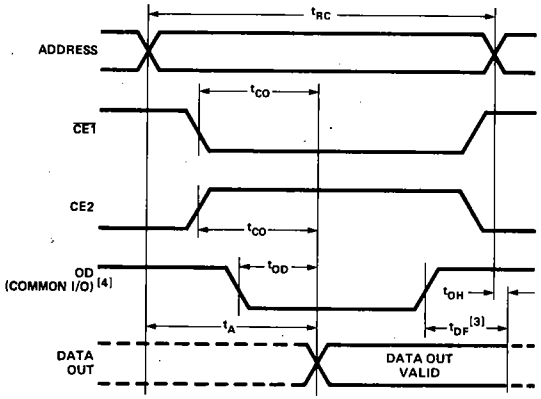
Output Load: 1 TTL Gate and C_L = 100pF

Capacitance[2] $T_A = 25°C$, f = 1MHz

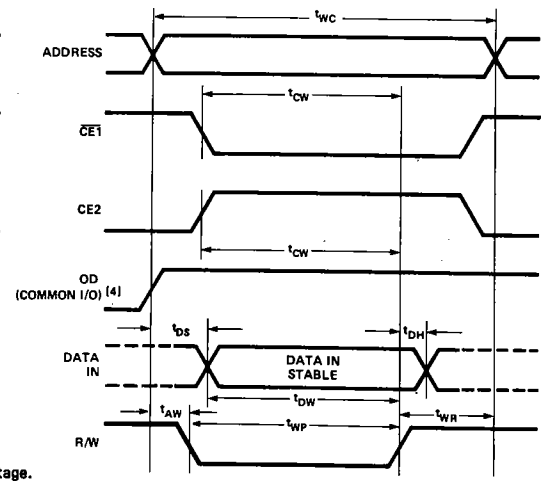
Symbol	Test	Limits (pF)	
		Typ.[1]	Max.
C_{IN}	Input Capacitance (All Input Pins) V_{IN} = 0V	4	8
C_{OUT}	Output Capacitance V_{OUT} = 0V	8	12

Waveforms

READ CYCLE



WRITE CYCLE



NOTES:
1. Typical values are for $T_A = 25°C$ and nominal supply voltage.
2. This parameter is periodically sampled and is not 100% tested.
3. t_{DF} is with respect to the trailing edge of $\overline{CE_1}$, CE_2, or OD, whichever occurs first.
4. OD should be tied low for separate I/O operation.

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